

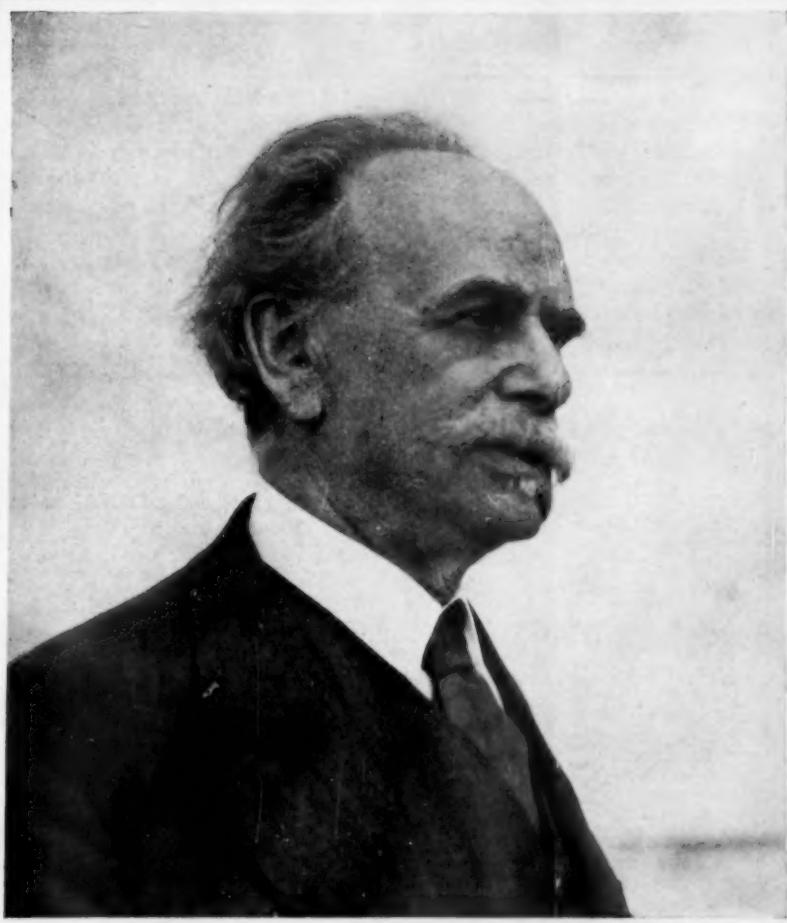
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JAN 12 1931

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE•



JANUARY 10, 1931

Dr. Franz Boas, Scientists' New President

See Page 23

A

SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

Vol. XIX

No. 509

The Weekly
Summary of Current
Science



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The Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by WATSON DAVIS

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DO YOU KNOW THAT

The parasol was a symbol of rank and authority in the far east for many centuries.

Few areas of like size are as free from destructive earthquakes as Canada.

The lowest land in Colorado is 3,340 feet above sea level.

Studies of 150,000 cows show that some farmers would have to milk 33 cows to get as much financial profit as other farmers get by milking three high-producing cows.

The Field Museum is displaying what it believes to be the oldest piece of pewter in existence: a tablet found in a Chinese tomb, and inscribed with a date equivalent to A. D. 85.

Hawaiian words are made out of an alphabet of only twelve letters—the vowels a, e, i, o, u, and the consonants h, k, l, m, n, p, w.

Chicago has a new manufacturing plant which converts soft coal into hard, and salvages valuable by-products in the process.

There are almost 500 persons in the United States whose incomes reach or surpass the million dollar mark.

Accidents on the baseball field, mostly on the amateur field, are more numerous than any other kind of recreation accidents, even more than swimming and bathing.

Tests show that pheasants may be kept from eating growing tomatoes, berries and melons by placing a few vessels of water nearby, as these birds pick at the fruits and vegetables to get water.

Sweet apple cider is found to have about the same food value as apples.

Fossil specimens of redwood tree found in the Arctic indicate that fifty million years ago the redwood forests of the American west were continuous between Asia and America, a land bridge then joining the two continents.

A World Conference on Work for the Blind is to be held in New York next April, with about 50 nations represented.

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Science Service presents over the radio, an address

CHARTING THE SEA AND AIR

By Rear Admiral W. R. Gherardi, U. S. N., in charge of the Hydrographic Office, U. S. Navy, Washington, D. C.

Friday, January 16, at 3:45 p. m., Eastern Standard Time,

Over Stations of
The Columbia Broadcasting System

PHYSICS

Man's Rays Stronger Than From Radium Win \$1,000 Prize

Carnegie Scientists Now at Work on New Method Which Promises to Build Up Potential of 30 Million Volts

THE most intense radiations ever produced by man, stronger than the penetrating rays from radium now used in treating cancer, are being manufactured in the laboratories of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington. Dr. M. A. Tuve, directing this research, reported its details to scientists of the American Association for the Advancement of Science in Cleveland.

The \$1,000 prize of the A. A. A. S. for "a notable paper at the annual meeting" was awarded the paper read before the American Physical Society by Dr. Tuve. The report was the joint work of Dr. Tuve and his associates, Dr. L. R. Hafstad and Odd Dahl.

The war against cancer, now being waged with the use of less powerful X-rays and radium radiations, may be aided greatly if the novel methods of Dr. Tuve and his associates are made available for hospitals.

The treatment of cancer was not the objective of these investigations. Dr. Tuve's researches have been aimed at investigating the atom, and he has strived to produce the swiftest and most powerful projectiles with which to bombard the hearts of atoms.

Four Laboratories in Race

Four great laboratories of physics, located in Schenectady, Pasadena, Berlin and Washington, have been in a friendly race to create new vacuum tubes which will withstand the millions of volts necessary to produce the extremely speedy electrons which excel the radioactivity of radium.

The champions of man-made speed, beta radiations produced artificially in Dr. Tuve's apparatus, hurtle along at a velocity within one per cent. of that of light, which no material object, according to the laws of Einstein, can ever exceed anywhere in the wide flung universe. The electrons of these beta radiations speed along at more than 184,000 miles a second.

The three kinds of rays to which are due the extraordinary properties of ra-

dium have been produced artificially in Dr. Tuve's laboratory. In addition to the fast-moving electrons which are known as beta rays, there are gamma rays, an electromagnetic radiation like light, but much shorter in wavelength. These artificial gamma rays are produced when the beta rays jolt a metal target placed in their path, although the gamma rays from radium are the result of disturbances in the core of the disintegrating atoms. The third kind of artificial radium ray is called alpha radiation and consists of heavy material hearts of helium atoms with two electrons bound to them.

Artificial alpha rays should be useful projectiles to shoot into matter in the hope of tearing an occasional atom into pieces. But Dr. Tuve plans to use the hearts of hydrogen atoms instead of helium atoms when he attacks the problem of atomic structure.

When the high voltage tubes are operating, the dangerous gamma rays penetrate to every corner of the laboratory. They can pass through three inches of lead and the danger from them is so great that physiologists have been summoned from Johns Hopkins University to study how the experimenters may be protected.

The tubes, which are constructed by

a special glass blowing process that prevents the electrical discharge from puncturing the glass, have been operated reliably at two million volts.

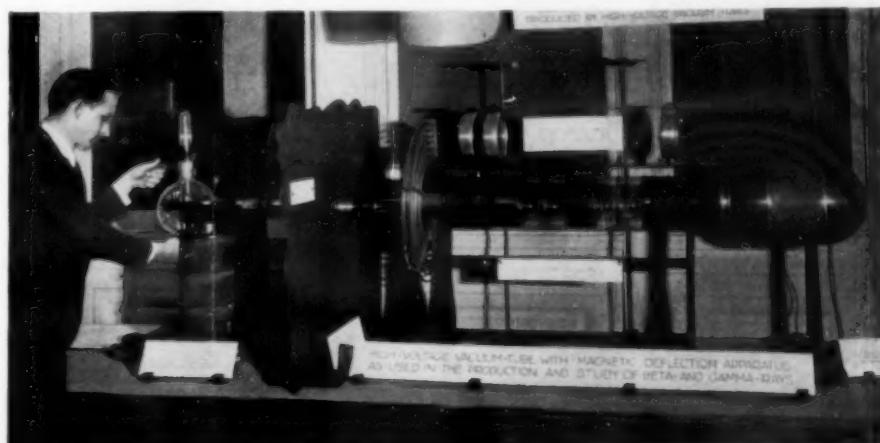
Although Dr. Tuve in delivering the prize paper at Cleveland did not discuss it, he and his associates are now at work on a new method of building up electrical voltages that should soon make it possible to impress upon gigantic X-ray or other vacuum tubes voltages much higher than the five million or so they have generated so far. Thirty million volts are theoretically possible with a modification of what is called the Faraday cage which has been developed.

Greatest Exploration of Matters

By using these voltages to accelerate the positively charged cores of hydrogen atoms, these scientists will have by far the most powerful projectiles ever available to a human being. These will resemble the alpha rays from radium. What will happen when they are let loose is still a matter of discussion among scientists.

Some physicists have suggested in the past that if such powerful radiations were allowed to smash into the hearts of atoms, there might be a liberation of the immense internal energy of the atoms with a gigantic explosion that would wipe out the world and this corner of the universe. This idea was the theme of the Broadway success of several years ago "Wings Over Europe" in which a scientist, not unlike the Dr. Tuve of real life, solved this secret of physics and held the fate of the nations and the world in his grasp.

But most physicists do not expect such a cataclysm. They expect the artificial radiations to be extremely useful in probing deeper the fundamental structure of matter. They expect as a by-



SUBJECT OF THE PRIZE PAPER

High voltage vacuum tube with magnetic deflection apparatus used in the production and study of beta and gamma rays.

product that the powerful radiation will be useful in the treatment of cancer and possibly put to other medical uses. They expect that the radiations will give new knowledge of the earth's magnetism and how it is caused. This latter possibility was the starting point of the whole investigation and the reason for its support by the Department of Terrestrial Magnetism of the Carnegie Institution directed by John A. Fleming. Incidentally, there will also come a better understanding of radio because physicists feel sure that the radio reflecting Kennelly-Heaviside layer above

the earth is affected by natural radiations that come from the sun and outer space.

Dr. John C. Merriam, president of the Carnegie Institution, expressed delight at the award of the American Association prize to the three members of his institution and explained: "Their work represents a long continued intensive study of this problem and it is a great pleasure to know of the recognition of the work at this stage of the investigations."

Science News Letter, January 10, 1931

BIOPHYSICS

"Artificial Cells" Point Way To Greater Knowledge

Famous Physiologist Thinks Creations of Cleveland Surgeon Will Aid Understanding of Living Matter

By DR. D. T. MacDOUGAL

Research Associate, Carnegie Institution of Washington

EDITOR'S NOTE: At the Cleveland meeting of the American Association for the Advancement of Science, Dr. George W. Crile, famous surgeon of Cleveland, announced the making of "autosynthetic cells" out of non-living extracts and mineral salts, and showed specimens under the microscope. This critique of Dr. Crile's work is written especially for the SCIENCE NEWS LETTER by one of the world's foremost students of plant physiology.

TO THE biologist concerned with the form and architecture of the living cell, the announcement of the results of Dr. Crile's researches on masses of stuff which show some of the properties of living matter will come as something of a shock.

The physiologists, however, especially the group who are engaged in studying the properties and the ultimate arrangement of particles in protoplasm, find in Dr. Crile's results many things of absorbing interest. Furthermore, there is a growing belief among workers that we may within the near future be able to set up small masses of material in the condition of a jelly in which many of the activities characteristic of living matter may take place.

Thus, for example, I have definite recollection that Jacques Loeb, whose researches are well known to all biologists, expressed high hopes that some-

thing like living matter would be compounded within the laboratory within a very few years.

Many of the experimental attempts in this direction have gone no further than the making of minute blobs of colloids which on the glass slide and under the microscope gave resemblances to the indefinite and constantly changing forms of the amoeba. The physiologist is primarily concerned with the energetics, performances or processes which go on unceasingly in living matter. In my own experiments in this direction, begun in 1922 at the Desert Laboratory of the Carnegie Institution, in Arizona, I went no further than taking capsules of cellulose, lining them with mixtures of jellies made up of the materials which enter into the composition of the plant cell.

Although the intimate arrangement of these materials could not be said to have been identical with that in living material, except in a general way, yet these experimental devices displayed two forms of activity quite similar to that of the absorbing hairs of roots. In an often-repeated series of experiments the permeability of these jelly layers was found to be similar to that of the tissues of living plants. The common mineral nutrient elements sodium, potassium, magnesium and calcium entered these "artificial cells" at the same relative rates as in a piece of living tissue.

The second performance in which the

activity of living stuff was imitated was one in which these "artificial cells" maintained their acidity for days at a time when immersed in an alkaline solution, after the manner of the protoplasm of a plant growing in an alkaline soil.

What the Cells Do

Some of these experiments were shown to Dr. Crile at the Desert Laboratory. I have therefore viewed these exhibits of Dr. Crile's results at the Cleveland meeting of the American Association for the Advancement of Science with considerable interest.

Dr. Crile brings together proteins, lipoidal brain extracts and mineral salts in small cavities on glass slides. Masses of material resembling unicellular organisms of various types appear in a few seconds.

The chief interest, however, lies in the fact that when quantities of this material sufficient for chemical and physical tests are accumulated, with characteristic electric potentials, stainability and other physical properties are readily measurable, and respiration data similar to those of masses of living tissue are secured. The transformation of energy indicated is at a rate which changes and runs through a cycle after a manner shown only by living organisms.

Only the worker who has engaged in experiments of this kind is in position to appreciate the enormous amount of wearisome labor necessary to secure the most meager results. It may be regretfully said that the difficulties attending a repetition of Dr. Crile's experiments will delay a checking-up of his results by other workers, which is so highly desirable in all scientific research.

Neither Dr. Crile nor anyone else makes the claim that he has actually "created life" in the laboratory. But the way is indicated along which we must travel in the endeavor to gain a fuller understanding of the nature of living matter.

Science News Letter, January 10, 1931

CHEMISTRY

Substitute for Sulfur Vulcanizes Rubber

A FIRST cousin to the TNT of war-time, a chemical called trinitrobenzene, will make possible rubber that can be used next to shiny silver and other metals without fear of causing tarnishing, discoloring and corrosion of the metals.

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This important development in rubber chemistry was announced through an exhibit of the U. S. Bureau of Standards at the meeting of the American Association for the Advancement of Science in Cleveland. The trinitrobenzene is used as a vulcanizing agent in rubber in place of the sulfur which is the chemical usually used to keep the rubber from being sticky.

The possibility of using trinitrobenzene to harden rubber during its manufacture was first suggested by a Russian chemist, Dr. Ivan Ostromislensky, of Moscow, who did his research during the World War in 1915. The chemists of the Bureau of Standards have now put this discovery to practical application and proved that the benzene compound produces rubber just as durable and strong as rubber using sulfur, with the added advantage that it is non-corrosive.

It is expected that the new benzene rubber will find important use in the manufacture of electrical cables and wire coverings in which the sulfur vulcanizing agent has caused some trouble in the past. It may also be possible to make rubber films or sheets to be used as protective coverings of metals that are attacked by sulfur.

Science News Letter, January 10, 1931

GENETICS

High-Yielding Corn Bred From Runts

HIGH-YIELDING, new varieties of corn, the hybrid offspring of parents inbred until they often look like runts, were described before the meeting of the American Association for the Advancement of Science in Cleveland by Prof. R. J. Garber, of the University of West Virginia. By breeding corn on its own pollen for generation after generation, it has been made possible to sort out many of the complex hereditary factors that make for high yield, and then by crossing the various pure-bred strains to combine the desired "ingredients" for more bushels per acre, just as a housewife assembles a cake.

Science News Letter, January 10, 1931

PHYSIOLOGY

Effect of Glandular Secretions On Sex Discussed by Scientists

Extract is Found to Correct Feminine Underdevelopment; Operation Makes Cockerel of Pullet in Appearance Only

THE latest information on sex, as it is influenced by glands, was exchanged by scientists engaged in many different institutions when they gathered in Cleveland at the meeting of the American Association for the Advancement of Science.

Underdevelopment of the essential physical basis of femininity may be corrected by an extract from a small gland located under the brain, researches by a University of Wisconsin team of three workers indicate. They are Dr. H. L. Fevold, Dr. F. L. Hisaw and Dr. S. L. Leonard. An extract from the front part of the hypophysis, a small ductless gland whose function was for many years a riddle, was found to promote very powerfully the development of the female sex glands in rats. Immature females less than four weeks old were brought to sexual maturity in three days by a series of injections of this extract. Continued injections after this point proved too much of a good thing; they provoked a great overgrowth of the ovaries.

At the University of Chicago, experiments by Prof. Carl R. Moore and Dr. Dorothy Price on the same glandular hook-up indicated that the Steinach hypothesis of an antagonism between the hormones, or active principles, of the male and female sex cells will not stand up. It is true that male extract injected into the veins of a female animal will set back the sexual development of that animal, and female glandular extract will affect male animals similarly. But the Chicago experiments produced evidence that this effect comes about indi-

rectly. The sex-gland extract affects the front lobe of the hypophysis, and this in turn affects the sexual development of the subject of the experiment.

Although removing the sex gland from a pullet will cause her to assume an external appearance much like that of a cockerel, and even produce within her body the development of what looks very much like a male sex gland, the luckless fowl thus transmuted is still not a real male. This is indicated by experiments reported by Dr. L. V. Domm, of the University of Chicago.

Dr. Domm took part of the contents of such an artificially induced "male" sex gland and attempted to fertilize the developing eggs of hens with them, but obtained no positive results. He also transplanted into the developing "male" glands of operated pullets pieces of real sex glands from cockerels, and allowed the transplants to grow. Later he removed the composite glands, and found motile sperm cells in them; but the fowls were nevertheless unable to function as males.

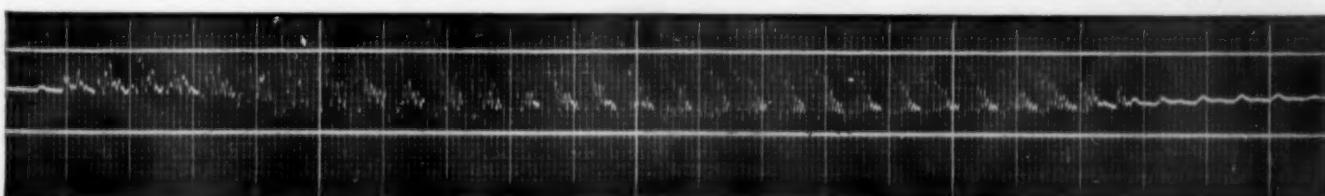
Science News Letter, January 10, 1931

PHYSICS

Photograph of Human Voice Produced in One Minute

A PHOTOGRAPH of the human voice is produced in one minute by a new rapid record oscillograph exhibited by the Bell Telephone Laboratories of New York at the American Association for the Advancement of Science in Cleveland.

This machine can be plugged into a



THE PICTURE OF THE WORD "SCIENCE"

As it is photographed by the rapid record oscillograph of the Bell Telephone Laboratories, demonstrated for the first time at the Cleveland meeting of the American Association for the Advancement of Science. Each little sound in the word has its own effect on the shape of the curve which is made by the vibrating sound waves acting on an electrical circuit.

telephone line or connected to a microphone and out of it will come a wavy line record that gives the exact characteristics of any voice, music or sound from zero to three thousand cycles per second. Duralumin wires of very slim diameter cast a shadow on the photographic paper record and their vibrations set in motion by the voice currents make the record.

A. E. Melhouse, of the Laboratories, also demonstrated a high-speed relay that can switch a current in three thousandths of a second. One use for this relay will be to silence a telephone line during pauses in the conversation. Less efficient kinds of similar relays have been used on the Transatlantic telephone circuits.

Science News Letter, January 10, 1931

PROPHECY

What Science May Make Of the World in 2,500 A. D.

Universal Language and Flood of Inventions Are Part Of Picture, But Warning Is: Don't Take It Too Seriously

A WORLD of the future, whose 350 hundred million people will be a grand blending of all races with one universal language for the spreading of culture and propaganda lies alike, benefiting from an ever-increasing flood of inventions and scientific discoveries and yet hard put to it for sources of power, with birth control knowledge in everybody's hands and babies at a high premium—these were some of the features of the centuries to come as imagined by three scientists who spoke before an interested, and at times amused, audience at the American Association for the Advancement of Science in Cleveland.

All this, and a lot besides, may come to pass—if. At the very outset, Prof. A. V. Kidder, archaeologist of the Carnegie Institution of Washington, warned his hearers, from his wide experience as a student of the rise and fall of past civilizations, that our present culture has all the symptoms of "being in for a terrific crash" unless by concerted effort scientists do something to forestall such an ill event.

But assuming that civilization will go on, Prof. William F. Ogburn, of the University of Chicago, and Prof. E. M. East, of Harvard, presented some Wellsian snapshots of the future, from their points of view as sociologist and biologist.

The whole nation will be citified, Prof. Ogburn said. Developments in transportation and communication will make every new thing, that the city man is now first to get, available just as quickly to the farmer. Farmers will therefore tend to become like city

people not only in the mechanics of their daily lives, but also in their folkways, their philosophy, their religion and everything else.

There will be less contrast between farm and factory, for in many cases the factory will be on the farm, to make use of raw materials right at the source. Distribution of electric power will make this possible. There will be less of "artificial foods" made by chemical means than many speculative minds now imagine. The old trilogy of the sun, soil and rain will continue to be the mainstays for food and clothing. But due to increased efficiency in farming, only a fraction of the people will be needed on the land and the rest will be absorbed into industry.

By the year 2,500 there will be no

more oil and very little coal, warned Prof. East. We may be hard put to it to find substitute sources of power. We are prodigals of inherited wealth now, and there is no guarantee that we shall develop the knowledge needed to develop new sources. Such things as wind, waterfalls and tide promise little, and the "cracking of the atom" is a dream.

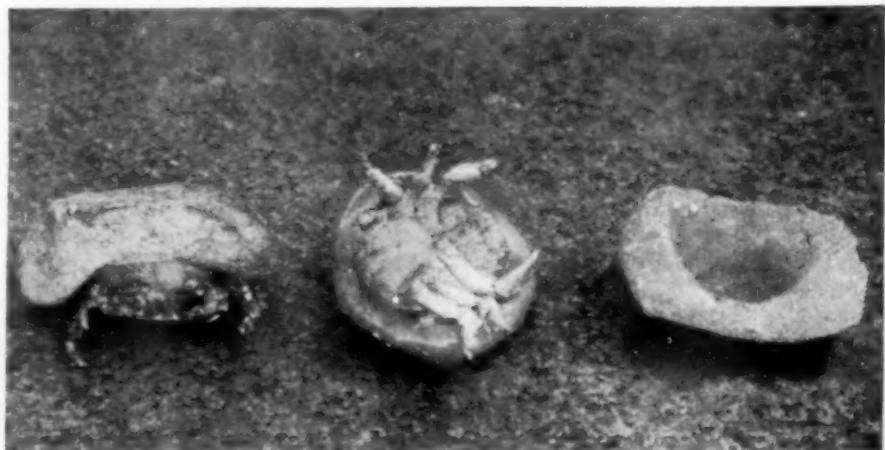
The population of the world will be greatly changed by 2,500. The white race will be in full possession of the Americas and of Africa. The native Indian and black population will largely disappear, and their remnants will be absorbed in the hybrid population. Asia will be held solidly by the Mongolians, and the brown race may hold its own but will probably not gain.

A scientifically eugenic social system will be a necessity if the race is to survive on a high plane. Caste systems of the past were roughly eugenic, though scientifically unsound. Present-day humanitarianism is dysgenic. A system of penalties for breeding undesirables, and of rewards for the right kind of offspring, may come into existence.

We may by then wipe out all disease germs, and with them such ills as tuberculosis, diphtheria and the "flu." Through better care of infants, the average life-term may be raised to 65 years. But this does not mean that we shall live forever. The increased industrial pace will probably bring into being new "functional diseases."

And at the end, the scientists took the audience into their confidence. "All this is quite possible and may well come to pass," they said. "Anyhow, it's a lot of fun to speculate this way. But don't take any of it too seriously."

Science News Letter, January 10, 1931



CAMOUFLAGE AND SHIELD

In one are supplied by an umbrella-shaped piece of sponge that this Australian crablet cuts out with his chelae and holds over himself with his hind legs as he scuttles about in the coral pools of the Great Barrier Reef. Zoologists call him *Cryptodromia tumida* which might be somewhat loosely Englished as, "fat-little-fellow-who-hides-while-he-runs."

ASTRONOMY

Theories of Universe Shaken By Discoveries at Harvard

Dr. Shapley Says Systems of Stars Are Scattered Irregularly, Instead of Uniformly, Throughout Space

WANTED, a new theory of the universe.

Dr. Harlow Shapley, director of the Harvard College Observatory, reported to the American Association for the Advancement of Science in Cleveland, a gigantic probing of the depths of the universe which shows that the galaxies, which are immense systems of stars, are scattered irregularly instead of uniformly throughout the great sphere of space that can be reached by the astronomical telescopes of today.

And that upsets the most favored conceptions of the universe around us.

It will be interesting and disconcerting news to Prof. Albert Einstein who is visiting in California where he will undoubtedly meet the latest of universe makers, Prof. Richard C. Tolman of the California Institute of Technology, who has improved the Einstein variety of universe and made it fit more closely the actual conditions.

Greatest Census

It will also be news to a Belgian priest, Abbé Le Maitre, who teaches astronomy and meditates fruitfully in his monastery cell. It was he who pointed out that the universe, as postulated mathematically by Einstein, would collapse if anyone in it did so much as wave his arm.

And Dr. Shapley's latest findings will also interest De Sitter and other mathematical astrophysicists who are studying the universe.

Dr. Shapley has made the greatest census of "island universes" within the universe itself that has yet been made. These great aggregations of stars, most of them larger than the great milky way group in which the sun is a very insignificant dwarf, are from a few millions to some hundred and seventy million light years away from us. In attempting to visualize these immense distances it must be remembered that light travels a hundred and eighty-six thousand miles per second.

Thousands of photographs were taken by Harvard astronomers at ob-

servatories in South America and Africa as well as at Cambridge, and a tenth of the area of the whole sky has been inspected for galaxies as faint as the powerful telescopes can photograph. Eighteen thousand new galaxies have been discovered.

The way these vast groups of stars are distributed throughout space affects the present theories of the universe. Actually Dr. Shapley finds that in one area of the sky there may be seven galaxies, while a short distance away in an equal area some forty to fifty may be counted. And the galaxies are unequally spaced as the depths of the universe are probed by the telescope from our earthly viewing point.

The results of Mt. Wilson Observatory explorations of smaller areas of the sky led to the conclusion that the galaxies were fairly evenly distributed throughout the universe, and Prof. Tolman's nonstatic conception of the universe, latest and most widely accepted, was built upon that assumption.

Dr. Shapley emphasized that his results would not completely scrap the present theories of the universe, but that further evolution of these theories will probably be demanded.

The first detailed map of a galaxy of stars was shown by Dr. Shapley. In the large Magellanic cloud he has found two hundred thousand giant and super-giant stars, each more than a hundred and fifty times as bright as the sun. Two thousand of them are ten thousand times the sun's brightness.

Great clouds of dark nebulosity that obscure the nearer parts of the Milky Way were discovered by Dr. Shapley and his associates in the course of adding ninety thousand stars to the Henry Draper star catalog of the Harvard College Observatory which already contained 225,000 stars.

Science News Letter, January 10, 1931

The American farmer of early middle age is less subject to nervous ailments than workers in other occupations, a research study shows.



DR. CHARLES F. ROOS

Who was elected permanent secretary of the American Association for the Advancement of Science.

GENERAL SCIENCE

Anthropologist is Elected New A. A. A. S. President

See front cover

DR. FRANZ BOAS, noted anthropologist of Columbia University, was elected President of the American Association for the Advancement of Science for 1931, during the Cleveland meeting. Dr. Boas is one of the leading figures in the field of anthropology. He has been engaged in this work throughout a very long and active career.

Dr. Charles F. Roos, now assistant professor of mathematics at Cornell University, was elected permanent secretary of the Association, succeeding Dr. Burton E. Livingston of the Johns Hopkins University, who has been made general secretary of the organization. Dr. Roos will be resident in Washington. He has been secretary of the section on social and economic sciences.

The scientists passed a resolution condemning the anti-vivisection bill now being considered by Congress, which would prevent experimental operations on dogs in the District of Columbia.

They also passed a resolution approving the proposed establishment of a national park in the Everglades of Florida, but only "under conditions that will completely exclude railway and other commercial developments and fully protect the floral and faunal associations within the limits that are to be established."

Science News Letter, January 10, 1931

PALEONTOLOGY

First Sea-Going Dinosaur Found in Chalk Beds

THE FIRST sea-going dinosaur ever discovered was described by Prof. M. G. Mehl, of the University of Missouri, at the meeting of the American Association for the Advancement of Science in Cleveland. It was a sort of a whale of a dinosaur, although it must have looked more like a giant turtle with a flat body about five feet long and as broad as it was long. Adding neck and tail, it reached a total length of about fifteen feet. Its bones were found preserved in the chalk beds of Western Kansas and it must have lived some hundred and twenty million years ago.

It was a member of the same family as the stegosaurus, familiar armored dinosaur whose arched back with upstanding plates of armor make him a favorite of those who visit natural history museums. The dinosaur who went to sea rearranged his bones so that he became a navigating animal instead of one efficient for dry land travel.

Science News Letter, January 10, 1931

ASTRONOMY

Another Huge Telescope Ordered for Canada

CANADA will soon have two of the world's three largest telescopes. This became known with the announcement to Science Service by Prof. C. A. Chant, head of the Department of Astronomy of the University of Toronto, that a 74-inch reflecting telescope has been ordered for the University from Sir Howard Grubb, Parson and Co., in England. Among existing telescopes, only the 100-inch reflector at the Mt. Wilson Observatory, in California, is larger. The figure refers to the diameter of the great mirror which concentrates the light of the star at which it is pointed.

According to Dr. Chant's announcement, the telescope will form the main feature of the David Dunlap Observatory.

At present Canada has the world's second largest telescope. This is a 72-inch reflector at the Dominion Astrophysical Observatory, Victoria, and it will become the third largest when the Dunlap instrument is completed. Third largest at present is the 69-inch reflector at the Perkins Observatory of Ohio Wesleyan University, Delaware, Ohio. The great mirror for this telescope,

made of glass manufactured at the Bureau of Standards, Washington, is now being completed at Pittsburgh. The telescope is expected to be in operation by next summer.

Two telescopes at present share the honors for the fourth largest. The 60-inch at Mt. Wilson is tied by a 60-inch at the South African station of the Harvard College Observatory.

All of these instruments will be far surpassed in size by the 200-inch reflector now being made in southern California for the California Institute of Technology. Such an undertaking is this, however, that it will probably be several years before it is completed. Another project for a huge reflector, perhaps even bigger than 200 inches, has the backing of a group of men in Miami, Florida, but as yet no actual work has been done on it.

Science News Letter, January 10, 1931

PHOTOGRAPHY-GEOGRAPHY

Long Distance Picture Shows Earth's Curve

PHOTOGRAPHIC proof of the curvature of the earth was offered by Dr. C. E. K. Mees, of the Eastman Kodak Company, Rochester, N. Y., in an address before the Society of the Sigma Xi, held in Cleveland, when he projected upon the screen an airplane picture taken in South America by Capt. A. W. Stevens, famous for his pioneering in long distance photography from the air.

The scientists of the audience were able to see for themselves that the horizon line of the photograph, taken from a distance of 250 miles, was slightly curved. So far as Dr. Mees could ascertain this is the first time that direct photography has confirmed the fact that the earth is round.

Capt. Stevens in taking the photograph, according to Dr. Mees, could not see the distant scene of snow-capped mountain he recorded on his photographic plate. He had to point his aerial camera at the horizon and make his exposure through filters in order to admit only the light that pierced the hazes of the atmosphere and carried the image through that great distance to his camera.

Another photograph of the landscape three hundred miles away was obtained, but it was not as good a picture as the other. Both photographs were shown by Dr. Mees through courtesy of the National Geographic Society.

Science News Letter, January 10, 1931



ORNITHOLOGY

The Colder The Air The Warmer The Bird

THE old rhyme, that answered the query as to what would poor robin do then, poor thing, with:

"He'll hide in a barn
To keep himself warm,
And put his head under his wing,
Poor thing!"

now seems to stand in need of revision. All that poor robin does is get warmer automatically.

So much is indicated, at any rate, by studies of S. Charles Kendigh, of the Baldwin Bird Research Laboratory, who reported in Cleveland before the Ecological Society of America what he has discovered about bird temperatures.

Birds have much higher body temperatures than human beings. They range between 102 and 113 degrees, which in man would be from dangerous to deadly fever. When the air gets warmer the bird gets cooler, and vice versa. During the breeding season the birds' temperature steadily goes down, corresponding with the seasonal rise in air temperature from May to August.

Science News Letter, January 10, 1931

GENETICS

Seldom-Seen Potato Seed Produces Better Potatoes

NEW and better potatoes from the seldom-seen potato seed produced from potato flowers were described at the meeting of the American Association for the Advancement of Science in Cleveland by Prof. F. A. Krantz, of the University of Minnesota. Potatoes are usually propagated from tuber cuttings because it is very hard to raise potato seed, he said. Pollen will not be fertile, flowers drop off before they set seed, and field diseases interfere with breeding experiments.

In spite of these difficulties the Minnesota scientist has persisted, and now has new varieties of better shape, earlier maturing-date and heavier yield than many old standbys.

Science News Letter, January 10, 1931

SCIENCE FIELDS

PALEONTOLOGY

More Evidence That Man And Sloth Lived Together

ANOTHER remarkable discovery of the remains of the shaggy, tawny, lumbering old ground sloth who lived in the Ice Age of Prehistoric America, has been made in the now famous Gypsum Cave near Las Vegas, Nev., by the Joint Expedition of the Southwest Museum and the California Institute of Technology, M. R. Harrington, leader of the expedition, has just announced.

An oval flint knife of unusual make has also been found in a deep layer of earth in the floor of the cave, and in this same deep layer is ground sloth refuse. All of this adds weight to the evidence which the expedition first uncovered last spring, to the effect that man inhabited America before the disappearance of the strange creatures of the Pleistocene or Ice Age, Mr. Harrington said.

The dryness of the cavern has preserved the sloth remains through some thousands of years. Bones that were found have shreds of muscular tissues still attached. Huge claws with horny covering were also found intact, and masses of the curious, coarse hair of the animal, ranging in color from pale yellow to dark red with some black shadings. The extinct sloth is of the genus scientifically known as *Nothrotherium*.

Science News Letter, January 10, 1931

ARCHAEOLOGY

Tombs of Great Kings Of Ur To Be Opened

IS UR of the Chaldees about to yield its greatest archaeological treasure? Archaeologists are hoping against hope that it may be so.

The burial place of the great king Ur-Engur who built the magnificent zig-zagurat at Ur 4,300 years ago has been reached, but not opened, by the joint archaeological expedition from the British Museum and the University of Pennsylvania Museum.

A complex of brick buildings, long buried in the earth, represents the tombs

of three generations of kings in the golden age of Ur, Ur-Engur, his son Dungi, and his grandson Bur-Sin, according to a report received at the Museum here from C. Leonard Woolley, field director of the expedition. The structures include vaulted chambers and passages, stairways, and deep, brick-lined pits.

"It is too much to hope that the royal graves should have escaped the notice of the enemies to whom Ur so often fell a prey, although until the last tomb has been opened hope will persist," Mr. Woolley writes.

"Even if we do not find a single object, however," Mr. Woolley adds, "we are amply rewarded for our excavations. The actual tomb of Bur-Sin is one of the finest monuments of Ur, but even that tomb seems almost insignificant with what has been revealed in the early stages of the excavation of Dungi's building."

A bricked-up door and broad stairs running down to long vaulted passages lie ahead of the excavators.

"Always, however, the great pit remains the center of all conjectures," he states. "And we are anxious to learn what lies beyond the stairs which run down to the entrance of the vaults and now terminate abruptly against the wall of straight-cut earth."

Science News Letter, January 10, 1931

BOTANY

"Pearls" Formed in Desert By Cactus Plants

PEARLS from cactus plants were displayed before the botanists at the meeting of the American Association for the Advancement of Science in Cleveland by Prof. Ansel F. Hemenway, of the University of Arizona. They are not real pearls, of course, but they are ornamental oddities, and they are formed in a way that is oddly analogous to the formation of the pearls of the sea.

Oysters form pearls as a response to injury or irritation, and cacti form their pearls in the same way. If a beetle bores into one of the giant cacti, or a desert rat bites it, or a passing Mexican whacks it with his machete, the plant surrounds the injured place with a hard, impermeable tissue that prevents the leakage of precious water and the entry of germs of decay.

At last, when the cactus dies and falls to pieces, these hard bits remain on the desert, as "pearls."

Science News Letter, January 10, 1931

PHYSICS

New Phonograph Record Will Play Whole Opera

A NEW kind of phonograph that can play a whole grand opera of two and a quarter hours without change of its film record exists in the experimental laboratory at the present time, Dr. C. W. Hewlett of the General Electric Company said in the course of a technical paper presented before the American Association for the Advancement of Science in Cleveland. It uses the same method of reproducing speech and music that is used by one system of talking motion pictures. (SCIENCE NEWS LETTER, Jan. 25, 1930.)

Five hundred feet of motion picture film with twelve sound tracks on it constitute the record of the experimental phonograph. The quality of the reproduction of sound is high and compares favorably with good radio reception from a nearby station. Commercial production of the new film phonograph is not planned for the near future.

Science News Letter, January 10, 1931

ICHTHYOLOGY

Fishes Leave Water To Avoid Drowning

FISHES that have taken to living mostly on land because they can't breathe in the water that is available to them, were among the curiosities described by Prof. A. S. Pearse of Duke University, before a joint meeting of the American Society of Zoologists and the Ecological Society of America in Cleveland.

There are a number of fish species that live in the shallow waters of the Oriental tropics. They spend a great deal of their time as air-breathers, scrambling around on land and even climbing up on the low vegetation of the shores. They often get more or less mythical reputations as treeclimbers.

It has usually been assumed that these fishes have developed their ability to breathe air because their pools periodically dry up. But Prof. Pearse suggested that they may be forced to leave the water because it is so stagnant and warm, and so teeming with other, smaller animal life, that it simply does not have enough oxygen left in it to keep the fish alive by means of the gill respiration which all orthodox fishes are supposed to depend on.

Science News Letter, January 10, 1931

BIOLOGY

Twins That Are Alike And Twins That Are Unlike

By MARJORIE VAN DE WATER

AS ALIKE as two peas in a pod! This expression is immediately brought to mind by the sight of what scientists term "identical twins." And recent studies of identical twins by physiologists, psychologists, fingerprint experts, and students of heredity, have revealed that the old saying really understates the case.

Identical twins are more alike than two peas in a pod! The two peas, when they grow up into adult vines, lose their similar appearance. One vine may be tall and the other short; one thriving and the other puny. The human identical twins continue to resemble each other closely all through life, and often die of the same diseases.

But how about the minds that dwell within the duplicate bodies? Are they identical also? Psychologists are eagerly seeking the answer to these questions, and are searching out pairs of twins the world over for detailed study.

Dr. Albert F. Blakeslee, of the department of genetics of the Carnegie Institution of Washington, has recommended the starting of a special school in New York City at which the only pupils would be identical twins. The teachers would also be identical twins.

There educators could try out the new methods they devise. If one twin under the new method showed great improvement, while the other one of the pair, under the old method, failed to improve likewise, the experimenter could feel that the new method was better. In this school also the psychologist could give the mental tests designed to measure the native ability of the children, and find out to what extent the twin children will give twin answers.

The comparatively few pairs of twins that have already been given detailed study show a startling resemblance to each other. Two twin brothers who entered the Royal College of Physicians and Surgeons on the same day were so much alike mentally that Dr. Clement Lucas, an English physician interested in the pair, looked up their school records. Their various school papers had been marked by 17 different teachers a total of 66 times, and in only one

case did they receive marks that were not exactly uniform. In that case the paper of one boy was called "excellent," while the other was marked "very good indeed." Both boys received the same number of points on the entrance examination to the medical school.

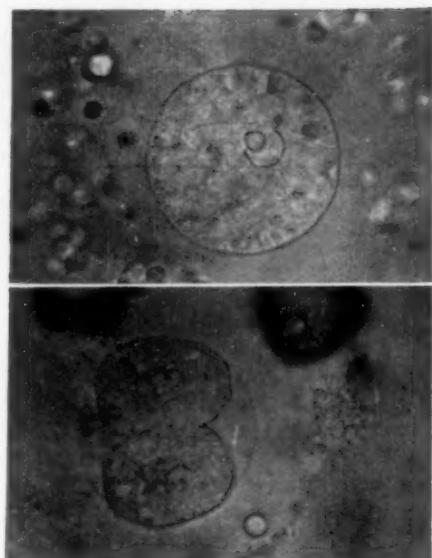
Can you think of any two brothers of your acquaintance, not twins, who could show a record of such exactly similar progress?

You may wonder whether this likeness is due to similarity in the way the twins think or whether it is just a result of their being together and consulting about the questions. Dr. Winifred Richmond, of American University, Washington, D. C., gives you the answer. She has given mental tests to twin children under circumstances making it impossible for them to get together about them at all. Yet they gave answers that were almost identical and received very nearly the same total scores in the grading. In the case of adult twins, especially those who have been brought up by foster parents in entirely different surroundings, it has been found that the two will respond a little differently to the mental examination. But the differences have never been so marked as the likenesses.

Always Interesting

Although twins have only recently claimed the attention of science, they have always been interesting to people in general and have been a favorite theme of the fiction writer. Some ancient tribes, and indeed a few parents in America, regard twins as a special curse, and would like to know how to avoid this doubling up in the nursery. Others consider them a special mark of distinction. In any case the announcement of the arrival of twins arouses an amount of excitement which the single child never stirs up.

And this excitement is not because twins are so very rare. In this country, about one per cent. of the births are twin births, but in many parts of Europe the rate is higher. In Heidelberg one birth out of every 52 brings twins. Rather it is the mystery of what



LIVES OF IDENTICAL TWINS

Begin in this fashion. Above is a single rat ovum, or egg cell, which has been penetrated by the male sperm cell. Below, the ovum is beginning its first division which must continue to make the myriad cells of the complete body. But sometimes at a later stage the group separates and forms two distinct but identical animals.

produces twins and why they seem to be cut from exactly the same pattern in a world where there are certainly an infinite variety of molds.

No one can tell with certainty what causes multiple births. Some tendency toward them does seem to run in certain families. Twins and triplets usually appear in a family which has already known multiple births either on the mother's or the father's side. And one pair of parents will often have more than one set of twins. A record seems to have been made by a couple recently reported in Mexico as having, in the course of 40 years of married life, no less than 18 pairs of twins.

About the manner in which twins are formed, biologists have learned a great deal in recent years. Through the study in the laboratory of rats, armadillos, and starfish; by means of photomicrographs of the eggs of these animals through all the earliest stages of development; scientists have pieced together the amazing story of how two human beings can be formed from the single egg cell that ordinarily develops into one person.

All living creatures, from the humblest form of jellyfish to the wisest college professor, have the same beginning as a tiny single egg cell or ovum. But the egg cell very soon divides into two and then those two split into four, and

this process continues until, long before the birth of an infant, there have been developed all the myriad cells which make up the human body.

Way back in the very earliest part of your life, when that original ovum had divided into a group of several cells, half the resulting cells were destined to become the right-hand parts of your body—your right eye, right ear, right nostril, the right side of your brain, and so on—the other half became the twin parts on the left-hand side of your body. Biologists therefore say that every normal individual is a perfectly-balanced and combined pair of twins.

Once in a great while, because of something which disturbs the normal course of development, the cell may separate into two entirely distinct parts, each of which develops into a complete and perfectly balanced human being. These two individuals, coming from a single ovum, are what biologists call identical twins. It has been found that the right hand of one of these persons is more like the corresponding hand of his twin than it is like his own left hand. He is more like his twin than he is like himself!

Sometimes unfortunately, the cells will only split partially. Instead of producing either a complete individual or just the right side of the head, one half the cell group may develop half a trunk, but a complete head. This sort of freak growth results in grotesque two-headed monsters or creatures with three arms or legs.

Occasionally, each of the halves may become an almost perfect human body, and then we have the type of two-in-one creature known as Siamese twins.

Not all twins are identical twins, however. Some are merely ordinary brothers and sisters who happen to be born at the same time. Biologists have found that such non-identical twins, or fraternal twins, as they are sometimes called, do not come from the same egg at all but from two eggs which happen to become fertilized at or near the same time, resulting in two simultaneous births.

Fraternal twins may not even be of the same sex, and are no more like each other than they are like other brothers or sisters at the same age. Indeed, they may be striking contrasts—one blond and the other brunette, one growing slowly and the other rapidly, one bright and the other slow to learn.

The only striking difference that sometimes appears in the physical

make-up of identical twins is what scientists appropriately call mirror imagery. The one twin, instead of looking exactly like the other will see his twin as he would see himself in the mirror. That is, his right side is like his twin's left side. Everything is reversed in the other twin. A right-handed twin will have a left-handed mate. The hair of one will part naturally on one side, while the other must comb his in the opposite direction.

This duplication in reverse can be noticed in even such minute details as the way the lips curve in a smile, and it accounts, sometimes, for a very different expression on otherwise identical faces. Even the lines in the palm of the hand correspond very closely for identical twins, although they may correspond either exactly right hand for right hand, or in the case of the mirror type of twins, right hand for left.

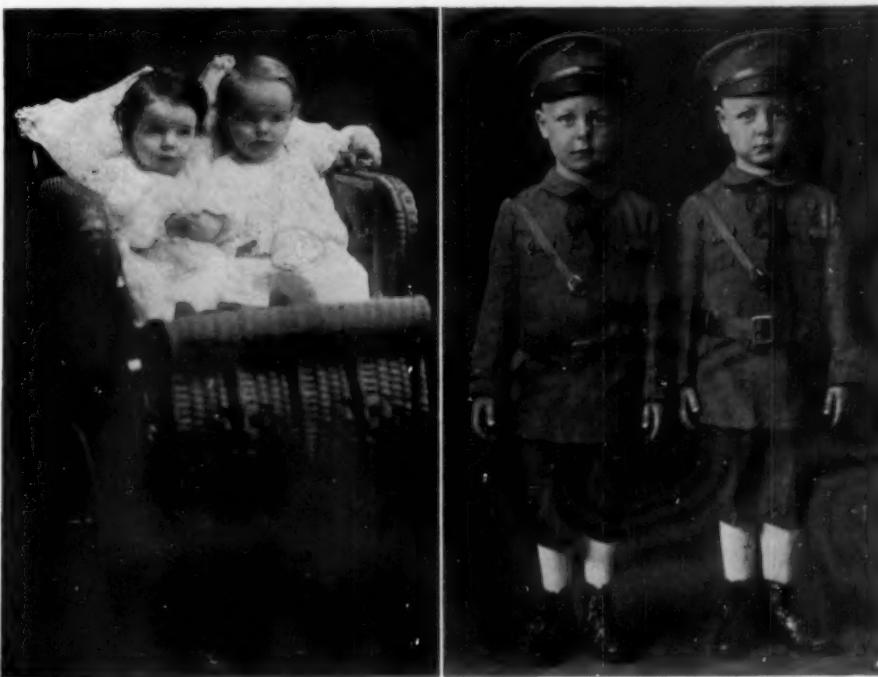
Finger-Prints Fail

Finger-prints which have long served as means of distinguishing one man from all his fellows cannot be infallibly used to tell one twin from another. In most instances, there are slight differences, but sometimes even the expert cannot tell which twin made a particular print. Handwriting, however, which has been thought by some people to betray the individual's secret thoughts and character, is not the same.

Prof. Johannes Lange, of the German Institute for Psychiatric Research in Munich, has studied thirty pairs of twins having one or both members in prison. Thirteen of the pairs were twins of the identical type, and of these ten had both twins in prison. Of the other seventeen pairs which were of the fraternal type, only two had both twins with a prison record. And when one of a pair of identical twins gains distinction in a favorable way, the other is almost bound to.

The Grosvenor brothers, for instance, selected different vocations, but nevertheless their careers have been singularly parallel. They went to school at the same age and graduated together. They entered the same college, and at the same commencement both attained that unusual honor of receiving their A.B. degrees "magna cum laude." Both have been writers, Gilbert as editor of the National Geographic Magazine, and Edwin as contributor to various law journals. Three clubs and two fraternities claim the membership of both, and in college they were enthusiastic about the same sports.

Tuberculosis has long been known to be a communicable disease, but physicians have also debated as to whether there was not also some hereditary predisposition toward the disease—whether two individuals might not be exposed to it in exactly the same way, and one



FRATERNAL AND IDENTICAL TWINS

Fraternal twins are merely brothers or sisters born at the same time. Identical twins develop from the same egg cell. See how unlike the fraternal twins are.

develop the disease while the other escaped unharmed.

If this predisposition toward developing tuberculosis is really a matter of heredity, then we would expect to find that whenever one identical twin had the disease the other would be pretty sure to get it also. On the other hand, we would expect it to be less likely that non-identical twins, or fraternal twins not having exactly the same heredity, would both develop the trouble.

A German physician, Privatdozent von Verschuer, member of the Kaiser Wilhelm-Institut für Anthropologie und Eugenik in Dahlem, has just checked up this very point and reported the results he found to the Berlin Medical Society. He found 75 pairs of twins, one or both of whom had tuberculosis.

ARCHAEOLOGY

Garlands Buried 3,000 Years Check Egypt's Calendar

GARLANDS of flowers tied across the breast of a dead Egyptian queen on a November day in the year 1049 B.C. have lain there for centuries in token of the respect and honor paid to an Egyptian royalty. Now, the flowers have found a strange, modern usefulness. They have served to reassure modern science that its efforts to match Egypt's calendar with our own chronology are accurate.

The mummy of the flower-decked queen, Meryet-Amun, was one of those discovered by the Egyptian Expedition of the Metropolitan Museum of Art. The expedition awaited a time when Prof. Percy E. Newberry of the Egyptian University in Cairo might identify the flowers. Now, the director of the expedition, H. W. Winlock, has reported to the Museum here that Prof. Newberry's examination has been made, with some singularly interesting results.

Faint Color Remained

"Such was the marvelous preservation of the flowers that some of them still retained a faint flush of color in their faded petals," Mr. Winlock writes. "Prof. Newberry could point out, without any question, blossoms of the acacia, petals of the lotus and of the red field poppy, and leaves of the willow."

A date marked on the wrappings of Meryet-Amun's mummy was translated

Of the 75, 19 pairs were identical while the others were fraternal twins. The age varied from 1 to 57 years.

Here are his startling figures: Of the 19 sets of identical twins, only 2 had one healthy member, and those two were under 18 years of age. In several cases the twins had been separated and had grown up in entirely different surroundings, but they were affected by tuberculosis in almost exactly the same way.

Contrasted with this record is that of the fraternal twins. Of the 56 pairs who did not have the same heredity although born at the same time, 24 pairs had healthy members, and in only 12 pairs were both twins affected in exactly the same manner by the tubercular infection.

Science News Letter, December 27, 1930

into our calendar as approximately November 25, 1049 B.C. And Prof. Newberry pronounced that all of the flowers and leaves belonged to that season. The acacia tree blooms after the Nile flood has receded, late in November, and the willow is then in leaf. The poppies were probably garden flowers, he pointed out, for wild poppies blossom in the grain field in March, but garden poppies might bloom in Egypt almost any time.

Additional evidence that the method of reading the date on the mummy fitted the season of the year was found in some *persea* fruits, half-ripe, laid at the foot of the coffin. These would have been just beginning to ripen in Thebes in November.

Meryet-Amun herself was already four hundred years dead when the floral tribute was placed on her breast. Her tomb was one of those rifled by robbers, and when Egyptian tomb officials eventually opened it four centuries after her death they set about repairing the damage. Hence the new mummy wrappings, the new date, the garlands.

All that was glittering or precious was gone from the tomb when the tomb officials found it. The robbers had even stolen the artificial eyes and eyebrows off the mummy-shaped coffin, and the sheets of gold which sheathed the coffin inside and out. The tomb

officials replaced the costly material originally used for the eyes and brows with a cheap glass. They had, it seems, only a day to make their repairs.

Meryet-Amun was the middle-aged wife of a boy king Amen-hotpe II, when she died. Her mummy has been added to the collections of the Cairo Museum, where many ancient Egyptian royalties now rest in safety and in retirement from public inspection.

Science News Letter, January 10, 1931



FLOWERS OF A QUEEN

Blossoms of acacia, petals of the lotus and of the red field poppy, and leaves of the willow, found adorning the mummy of Queen Meryet-Amun.

BIOLOGY

Magnetism Heals Mutilated Flatworms

MAGNETISM as a healing agency was suggested many years ago, but was seized upon and exploited by quacks to such an extent that it fell into complete disrepute. Now, however, comes a reputable scientist who has apparently been able to do something of the kind with a strong magnetic field, at least with lower organisms.

Prof. R. A. Muttkowski, of the University of Detroit, told the American Association for the Advancement of Science how he has exposed mutilated flatworms to the influence of a powerful electromagnet, and found that they grew their lost body-parts more rapidly than did untreated "control" specimens. Too much of a good thing, however, proved harmful.

Science News Letter, January 10, 1931

Are you blindly groping for words to fit your thoughts?



"What word conveys the exact shade of meaning I desire?"
"Is there a better word than the one I am using?"

"What is that word I have forgotten?"
"Is there a word in the language which
expresses my thought clearly?"
"How can I avoid this con-
stant repetition?"

STANGE, isn't it, with all the marvelous wealth of our English language that you should find yourself groping blindly for the answers to such word questions as those above.

Strange, with a language so full of expressive words, that it should be so difficult to find the ones that express your thoughts clearly.

With more than 150 words describing various shades of *beauty*, or over 400 words denoting various degrees of *goodness*, for instance, why should it be so hard to find the best one for your purpose?

Yet it is not strange either, when you consider that dictionaries are arranged on the assumption that you know all of the more than 200,000 words in the language and seek merely their definitions—that all attempts to make the language available stopped with merely listing the words by ideas, and then not always in alphabetical order.

No wonder the average working vocabulary is less than 2500 words—that you find it so difficult to express your thoughts and your most powerful ideas become mere vague impressions in the minds of your listeners or readers.

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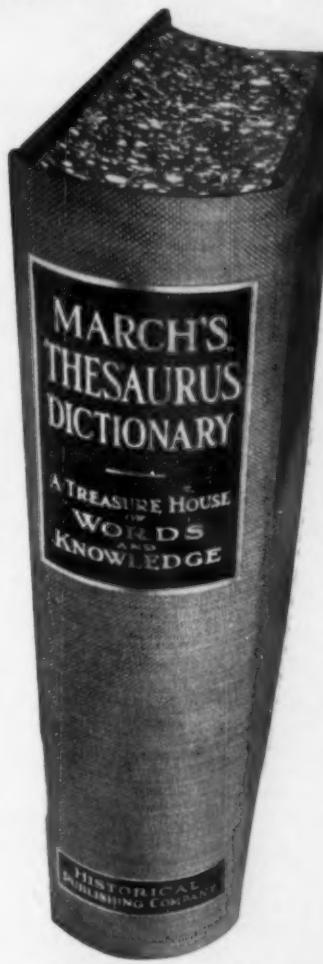
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BOTANY

Isolated Plants Reveal Story Of Post-Glacial Period

PATIENT plants, that have waited a hundred thousand years or more to tell us what the landscape was like when the ice of the glacial age passed away, were discussed by a group of botanists at the meeting of the American Association for the Advancement of Science in Cleveland.

Far-flung across the upper Mississippi valley, all the way from Pennsylvania to Kansas, there are nooks and corners sheltering relicts of the vegetation that once covered the land during the chill, stormy summers that slowly forced the age-old ice front back. There are hundreds of miles south of the main armies of their own kin, colonies of such northern things as white pine, Canadian yew, balsam fir, white spruce, Arctic primrose, harebell and bearberry. They grow in bogs and swamps, in deep protected ravines, on high limestone cliffs and in other places from which the main plant population, that has come in since the

end of the Ice Age, has not yet been able to crowd them. Some of them, however, are plainly on the downhill road.

Buried in the peaty muck of the vanishing bog lakes are preserved remains of their actual ancestors, that died in the struggle against the stubbornly retreating ice and were buried in the silts released by its flood-waters. Studies of such plant communities can tell us much about what our land was like while our own ancestors wore skin clothes and fought with stone weapons somewhere in the still unknown interior of Asia.

Among the participants in the program were Dr. A. Hollick, of the New York Botanical Garden; Prof. P. B. Sears, of the University of Oklahoma; Prof. O. E. Jennings, of the Carnegie Museum of Pittsburgh; Dr. E. Lucy Braun, of the University of Cincinnati; and Dr. Winona H. Welch, of DePauw University.

Science News Letter, January 10, 1931

BOTANY

Nature Ramblings
By FRANK THONE



Geraniums

AS WINTER takes solider hold upon the land, and there is less and less to see in the woods, we begin to take refuge and consolation in potted plants indoors. For man is, by some old memory, a creature of semi-tropical woodlands and never feels at home in the temporary Arctic he has to endure every year in high latitudes. So he builds little bowers to keep his soul alive until spring.

Of all potted plants, the red geranium is the staple, the standby, the one thing that a housewife will have if she lacks all other houseplants. It is handed down from mother to daughter through generations, it is passed along from neighbor to neighbor through whole streets, it is multiplied into dozens by "slips" stuck into a bottle of water.

The geranium is well adapted to the hard life a potted plant has to live in the average modern house or apartment. It has to get along with intermittent waterings and yet keep its water-supported life going in an atmosphere almost as dry as the Sahara. It can do this because it is a plant of semi-arid habitat to begin with. It has a thick, succulent stem that serves as a water reservoir, and can keep the plant alive even if drought causes the leaves to wither and drop off. And its vitality is so high that even after a drought of this kind it will break crazily into bloom as soon as you give it a cupful of water.

Cheap if you like, plebeian if you choose to call it so, the red geranium has its own good place in the world and fills it praiseworthy and well.

Science News Letter, January 10, 1931

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ASTRONOMY

Some Stars Form Saturn-Like Rings From Spinning Fast

Astronomical Meeting Also Told How Light Absorption Affects Measurement of Stellar Distances

IF MODERN telescopes were powerful enough to show stars as well as they show the planets, some stars of the class known to astronomers as "type B" would appear much like the planet Saturn. Like that body, they would be surrounded by a ring, according to a suggestion made to the American Astronomical Society at its meeting in New Haven, by Dr. Otto Struve, of the Yerkes Observatory.

Dr. Struve pointed out to the astronomers that the bright lines which appear in the spectrum of these B type stars have long been a puzzle. The dark lines, which are seen in the spectrum formed when the star's light is analyzed through the prisms of a spectroscope, "are known to originate in the gaseous atmospheres of the stars," he said.

Origin of Bright Lines

"It is now suggested," he continued, "that the bright lines in the spectra of B-type stars originate in nebulous rings which have been formed around the stars as a result of rapid axial rotation. Such stars resemble in appearance the planet Saturn. Extreme axial rotation, exceeding 250 kilometers (155 miles) per second, at the equator, causes the stars to be very flat at the poles. From the investigations of the British astronomer, Sir James Jeans, it is known that a gaseous body in rapid rotation may, under certain conditions, become lens-shaped. Such an unstable rotating star will eject matter at the sharp edge of the equator, and a nebulous ring will be formed. This ring must revolve around the star, as does the ring of Saturn."

The spectrum of such a star would be different, depending on how we look at it, he stated. If the axis of the star points to the earth, the bright lines from the nebulous ring will be single and sharp. But if the earth is in the plane of the ring, then the lines will be double. This is because part of the ring is moving away from us, and part towards us, causing shifts of the same spectral line in opposite directions. Dr.

Struve, in conclusion, declared that "This hypothesis appears to account in a satisfactory way for the results of observation."

The sun, together with the earth and other members of the solar system, is about 10,000 light years, or 60,000,000,000,000 miles, closer to the center of the galaxy than previously supposed. This idea was advanced by Dr. Piet van de Kamp, of the McCormick Observatory of the University of Virginia, who told the astronomers how his studies of the absorption of light in interstellar space had led him to this conclusion.

Last spring Dr. R. J. Trumpler, of the Lick Observatory, found good evidence for such an absorption. Later Dr. van de Kamp found still other evidence for it, and since then two German astronomers have also detected it. The result of such absorption would be a rapid falling off in brightness of distant stars, because their brightness would be reduced not only by the distance the light had to travel, but also by the greater amount of absorbing stuff that the rays would have to penetrate.

The Galaxy is the system of stars to which belongs the Milky Way and all

the stars that we can see, including the sun. Previous efforts have been made to measure the distance of the solar system from the center, notably by Dr. Harlow Shapley, director of the Harvard College Observatory. Using two different methods, he obtained distance of the center of 16,400 parsecs and 14,400 parsecs. A parsec is the astronomer's unit of distance. It equals $3\frac{1}{4}$ light years, or nearly 20 million million miles. Dr. Shapley's results depended on measurements of the distance of stars from their brightness, and would therefore be too great if the light was partly absorbed while on its way. Another determination by a Dutch astronomer, using a method not dependent on brightness, gave a value somewhere between 7,000 parsecs and 11,000 parsecs.

Dr. van de Kamp's researches confirm the figure of his countryman, for they indicate that Dr. Shapley's figures are too large.

"At present," he stated, "the conclusion may be drawn that, on the basis of galactic absorbing matter, the distance to the galactic center, as derived from the globular clusters, will have to be reduced, possibly from 16,700 parsecs to 13,700 parsecs, or even to about 10,000 parsecs. A distance to the galactic center of about 12,000 parsecs (roughly 40,000 light years) is probably a fair compromise between the various values."

Science News Letter, January 10, 1931

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• First Glances at New Books

Astronomy

MAN AND THE STARS—H. T. Stetson—*Whittlesey*, 221 p., \$2.50. In this interesting book the director of the Perkins Observatory answers many of the questions that the layman often wishes to ask the astronomer, but which are so seldom answered in ordinary books on the subject. One is the possibility of life elsewhere in the universe. He thinks life somewhat like ours conceivable on Mars and Venus, but not on the other planets. "In . . . systems around some distant stars," he says, "there may now be some planet far more like the Earth than is the planet Mars."

Science News Letter, January 10, 1931

Acoustics

ACOUSTICS—G. W. Stewart & R. B. Lindsay—*Van Nostrand*, 358 p., \$5. The telephone, radio broadcasting and talking movies have all helped make acoustics of more importance today than ever before. Therefore this work, based on a course given at Yale by the authors, is especially welcome. It is a clear exposition of the essential parts of the theory with the modern application particularly emphasized.

Science News Letter, January 10, 1931

Botany

COLLEGE BOTANY—G. B. Rigg—*Lea and Febiger*, 442 p., \$4. One of the leaders in botanical science on the Pacific coast presents his contribution toward the better teaching of general botany in the colleges. The book has the advantage of drawing on the Pacific flora for its examples to a greater extent than do most texts, at the same time retaining its applicability to and usefulness in other parts of the country.

Science News Letter, January 10, 1931

Chemistry

A FIRST YEAR PRACTICAL CHEMISTRY—Dennis Brooks Briggs—*Dent*, 77 p., 50c. Though published in England, this well arranged laboratory manual for elementary chemistry could easily be used in American institutions.

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Histology

A TEXTBOOK OF HISTOLOGY—Harvey Ernest Jordan—*Appleton*, 857 p., \$7. Fifth edition of a text for medical students by the professor of histology and embryology at the University of Virginia. Believing that success in teaching the subject depends on arousing the

student's interest, an effort is made to show the relation of the material to practical needs and uses. In this revision the chapters on the blood and endocrine tissues have been given special attention in order to bring them up to date.

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Botany

TREES—Charles A. Hall—*Macmillan*, 88 p., \$1. The writer combines enthusiasm for the fine forests of Britain with adequate and accurate popular dendrological descriptions. An outstanding feature of the book is found in the superb colored plates of forest landscapes from paintings by first-class artists.

Science News Letter, January 10, 1931

General Science

WORKBOOK TO ACCOMPANY INTRODUCTION TO SCIENCE—Otis William Caldwell and Francis Day Curtis—*Ginn*, 245 p., \$72. This is a laboratory manual intended to accompany the authors' general science text, "An Introduction to Science." It contains over a hundred experiments, obviously too many to be performed in one year, but this is intentional, so that the teacher may select the ones needed to fit individual differences. Throughout the student is encouraged to think for himself and to use systematic methods. He is told what to do, and told in a way to make it easy for him to understand the significance of what happens.

Science News Letter, January 10, 1931

Pathology

TEXTBOOK OF PATHOLOGY—E. T. Bell—*Lea and Febiger*, 627 p., \$8. The contributors to this text for medical students, besides Dr. Bell who edited it, are Drs. B. J. Clawson, Hal Downey, J. S. McCartney, J. C. McKinley, and C. J. Watson, all of the University of Minnesota. An effort is made to correlate the material with the students' clinical lessons.

Science News Letter, January 10, 1931

Paleontology

PARADE OF THE LIVING—John Hodgdon Bradley, Jr.—*Coward-McCann*, 308 p., \$3. The author brings to this popular presentation of the procession of life as seen by the evolutionary paleontologist, a swing of style and vividness of phraseology that are usually reserved for novels.

Science News Letter, January 10, 1931

Fantasy

ULTIMO—John Vassos and Ruth Vassos—*Dutton*, \$5. A score and one of fantastic futuristic drawings of a race driven into vast, underground cities of a scientific future by the final refrigeration of the earth, each faced by a page of text narrating the not-very-desirable life of that distant day and the uneasy will to escape by our descendants of the n-th generation.

Science News Letter, January 10, 1931

Biology

COLLEGE BIOLOGY—H. R. Barrows—*Smith*, 414 p. \$3.50. New biology textbooks have the handicap of entering an already very much crowded field; but the present one seems to be well equipped, in text and diagrammatic illustrations, to meet the struggle for existence. The book shows a most marked reaction from the "speak softly" wave that followed the anti-evolution outburst five years ago: nearly one-fourth of it is devoted to the subject of evolution.

Science News Letter, January 10, 1931

Botany

STUDIES OF AMERICAN PLANTS—IV—Paul C. Standley—*Field Museum*, 103 p., 75c. A continuation of taxonomic studies by Mr. Standley. Most of the material here treated is Central American.

Science News Letter, January 10, 1931

Physics

ENERGY AND POWER—Morris Meister—*Scribner*, 238 p., \$1.08. A physics text intended for elementary and junior high schools. In an effort to make it attractive to the student, the author has written many parts in dialogue. Easy experiments are a feature of the work.

Science News Letter, January 10, 1931

Chemical Engineering

THE METALLURGISTS AND CHEMISTS' HANDBOOK—Donald M. Liddell—*McGraw-Hill*, 847 p., \$5. The third edition, revised and enlarged, of a valuable reference book of tables and data for the student and metallurgist.

Science News Letter, January 10, 1931

Botany—Entomology

FIFTY COMMON PLANT GALLS OF THE CHICAGO AREA—Carl F. Gronemann—*Field Museum*, 348 p., 25c. Another of the excellent Field Museum leaflets on the natural history of the Chicago area.

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